



Photo by Dennis Olive, NASA/Marshall Space Flight Center

At Joint Propulsion Conference

Marshall Center Director Art Stephenson speaks during the opening ceremony of the 36th annual American Institute of Aeronautics and Astronautics Joint Propulsion Conference and Exhibit at the Von Braun Center on Monday. Stephenson is one of four co-chairs for the three-day event.

Thermal battery tested for possible upgrade to Solid Rocket Booster

by Debra Valine

On Tuesday, the Marshall Center moved one step closer in a quest to develop a technology demonstrator that one day may be a safety upgrade to the Space Shuttle Solid Rocket Booster.

The option tested in Marshall's Hydraulics Lab — an Electric Auxiliary Power Unit powered by thermal batteries — could eventually provide an alternate steering power source for the Shuttle Vehicle. The current power source is a turbine powered by hydrazine fuel, a highly flammable and toxic material.

"The test team is elated," said Brent Gaddes, project engineer for United Space Alliance of Huntsville. "The thermal batteries easily met the power demand, and all test objectives appear to have been met. Thanks are due to the great Marshall-Contractor team that worked so hard to bring this test to completion."

In addition to the Electric Auxiliary Power Unit with thermal battery, the Space Shuttle Projects Office is overseeing demonstrations of three other candidate technologies to upgrade the current

See Batteries on page 5

NASA enriches U.S. Teachers of the Year with trip to International Space Camp

U.S. Teachers of the Year will attend the International Space Camp again this year thanks to a \$70,000 pledge from NASA. The weeklong program — now in its 11th year — will be July 29-Aug. 4 at the U.S. Space & Rocket Center.

Educators from 30 countries will join the Teachers of the Year for a week of space science education, teacher enrichment activities and professional collaboration. Two students from each of those

countries will attend a youth-oriented Space Academy program.

NASA is a long-time supporter of the Space & Rocket Center and U.S. Space Camp programs.

"One of NASA's primary goals is to inspire our young people to pursue careers in engineering, math and science," said Marshall Center Director Art Stephenson. "Supporting excellence in education through the Teacher of the Year program is an effective way of accomplishing that goal."

"We are very excited that NASA is once again demonstrating its ongoing commitment to excellence in education," said Larry Capps, chief executive officer of the

Space & Rocket Center. "Educators are some of the world's best ambassadors for the space program and their participation here will carry over to classrooms around the world."

The funds provided by NASA are designated specifically for the U.S. Teachers of the Year and will cover their transportation, food, lodging and Space Camp tuition.

Teachers of the Year are selected by each state's department of education after reviewing nominations from local school systems. The program dates back to 1953, and is the oldest awards program to focus public attention on educator excellence.

"Safety is no Accident"

— Safety slogan submitted by
Brice Marsh, CSC

Countdown to Safety Bowl

Editor's note: A previously published question has more than one correct answer, depending on the source of reference and the year. "What is the No. 1 cause of weather-related deaths?" had the answer of "lightning." While this may be true for some locations for particular time periods, the statistical parameters to support that answer were not given. Therefore, that question will not be used as stated. According to the National Weather Service data, the "No. 1 weather killer" in the United States in 1997 was flooding, but in 1998 it was extreme heat. In 1995, lightning (85 fatalities) outranked flooding (80 fatalities), but the deaths due to extreme heat in that year exceeded 1,000. Weather-wise, July was the deadliest month for both 1995 and 1998. Please keep the effects of extreme heat in mind as you plan your summer trips and outings.

Marshall's Safety Bowl begins Aug. 30 and culminates with the championship on Safety Day, Oct. 18. Teams from each directorate will compete. Teams should be selected by Aug. 7. For more information, call Irene Taylor at 544-2051.

Sample Questions

- Where can open "Safety, Health and Environmental Issues" for a Marshall facility be found?
- One quart of motor oil can contaminate up to how many gallons of drinking water?
 - Two hundred
 - Two thousand
 - Two hundred thousand
 - Two million
- Which of the following is NOT a common warning sign of a heart attack?
 - Heavy pressure in chest
 - Pain in shoulders, neck or arms
 - Fever
 - Shortness of breath
 - Nausea or vomiting
- Where is the safest place to be during a lightning storm?
 - In a car
 - In the middle of a field
 - In a house or building
 - Lying face down on the ground
- The majority of bike-related deaths are due to injury to the
 - head
 - neck
 - chest
 - back

See Answers on page 5

Open House Awards



Photos by Dennis Olive, NASA/Marshall Space Flight Center

Mike Tripp, left, of Science Applications International Corp., presents awards on behalf of the Open House contractor partners to Debbie Scrivner, second from left, of the Business Management Office in the Space Transportation Directorate, and Open House Chairman Thom Holden, of Marshall's Employee and Organizational Development Department, Customer and Employee Relations Directorate. Marshall Center Deputy Director Carolyn Griner, second from right, looks on. The awards were presented during the Open House ice cream social held Friday to thank the Marshall team for its support of the event.



Doug Stoffer, center, employed by Wang, accepts an Open House Commemorative Pin Award on behalf of all contractors who helped with the event. Patty Montgomery, right, of the Information Services Department in the Center Operations Directorate, accepts the award on behalf of all civil servants. Marshall Center Deputy Director Carolyn Griner, left, presented the awards.

Obituaries

Alter, John D., 66, of Sunnyvale, Calif., died June 25. He retired from Marshall in 1990 where he worked in technical management.

Mercer, Hugh A., 69, of Huntsville, died July 5. He retired from

Marshall in 1994 where he worked as a program analysis officer.

Brightwell, Wanda T., 77, of Huntsville, died July 9. She retired from Marshall in 1984 where she worked as an accounting technician.

Twin-telescope sky survey 'gives you the stars'

Your home computer can become a portal to a wonderland of stars, thanks to a massive release of images from an infrared sky survey sponsored by NASA and the National Science Foundation.

"Any computer with a Web browser can be transformed into a desktop observatory," said Dr. Michael Skrutskie, of the University of Massachusetts in Amherst, principal investigator of the sky survey, which has scanned the nighttime sky and produced an online image potpourri of half a million galaxies and 162 million stars.

"The images were gathered by the Two-Micron All Sky Survey (2MASS), the most thorough census of stars ever made. The survey detects infrared wavelengths that are beyond the red light in the rainbow of visible colors.

Operations for 2MASS began in 1997. Its catalogs will contain more than 300 million objects by the time observations are concluded in 2001. Final processing of the data and release to the public will be complete by 2003.

A sampling of the images (including the center of our Milky Way Galaxy, the hat-shaped Sombrero Galaxy and the Orion Nebula) is posted online at:

<http://www.ipac.caltech.edu/2mass/gallery/second/>

Marshall marks 40th anniversary

Mercury-Redstone developed to put humans in space

This is the fourth in a series of historical articles the Marshall Star will publish this summer on the history of the Marshall Center.

by Mike Wright

After the Russians launched Sputnik and the Americans launched Explorer I, the space race was on. But Sputnik and Explorer were only machines in space.

Next, the great superpowers rushed to beat each other in a race to put a human in space.

As a result, NASA asked Wernher von Braun's group in Huntsville to modify and test an Army Redstone missile that the space agency could use to launch a manned Mercury capsule.

Between April 1959 and July 1960, von Braun's engineers in Huntsville ground-tested the Redstone's propulsion systems more than 200 times. Unfortunately, their first attempt to launch an unmanned Redstone was a complete failure.

Already under pressure from newspapers and politicians reminding them of the progress the Russians were making, von Braun and his engineers went to work on the technical problems that had beset the launch. They successfully launched their first unmanned Mercury-Redstone on Dec. 19, 1960, and then launched another on Jan. 31, 1961.

Next, the scientists placed a 37-pound chimpanzee named "Ham" in a Mercury capsule and launched him on a Redstone. Ham returned in good health, but the Redstone engine had unexpectedly run with the throttle wide-open, a situation that caused von Braun to call for an additional unmanned Redstone launch on March 24, 1961. Finally, von Braun's Redstone was ready to launch America's first astronaut, Alan Shepard, into space.

Unfortunately, another event stole some of Redstone's thunder. On April 12, 1961, the Russians announced that Maj. Yuri

Upcoming Events

Super Guppy viewing — NASA's Super Guppy Aircraft will be on display for Marshall team members from 4-6 p.m. Monday at Bldg. 4817 at the Redstone Airfield. The NASA Super Guppy is stationed at Ellington Field in Houston and is used primarily to support the shipment of oversized Space Station Hardware. The flight crew will be on-hand to answer any questions.

Blood drive — The American Red Cross will hold a blood drive from 8 a.m.-1:30 p.m. Friday at the NASA Exchange, Bldg. 4752. If you are unable to attend this blood drive, you may go to the Madison County Chapter, 1101 Washington St. in Huntsville. Those whose last names begin with A-B should donate at 8 a.m.; C-F, 8:30 a.m.; G-H, 9 a.m.; I-L, 9:30 a.m.; M-O, 10 a.m.; P-S, 10:30 a.m.; and T-Z, 11 a.m. If unable to make appointment times, the Red Cross will be available until 1:30 p.m.

Washington Update Luncheon — A Washington Update Luncheon with U.S. Rep. Bud Cramer of Alabama will be at noon Aug. 10 at the Von Braun Center North Hall. Tickets — at \$20 each — are available through Aug. 2. by calling Rosa Kilpatrick at 544-0042.

Gagarin had successfully orbited the Earth for 108 minutes in a 5-ton spacecraft. Gagarin became the first human to make a successful orbital flight through space.

The chance to launch Shepard on a suborbital flight came within weeks of Gagarin's flight. On May 5, a Redstone rocket supplied by the Marshall Center lifted off at Cape Canaveral, Fla., carrying Shepard in his Mercury spacecraft, nicknamed "Freedom 7." Shepard rose to an altitude of almost 116 miles and covered a range of more than 300 miles on a suborbital flight that lasted less than 15 minutes.

Von Braun had been conciliatory toward the Russians following the Gagarin flight, but his tone changed after Shepard's flight. He predicted that the Americans would go even farther in the space race "eventually landing a man on the Moon." The people of Huntsville "will share in these achievements," he told The Huntsville Times.

The writer is the Marshall historian.



Courtesy photo

Hickam: Hometown Hero

More than 3,000 people recently attended the second annual "Rocket Boys Days" in Coalwood, W. Va. The day honors former Marshall employee and Coalwood native Homer Hickam, author of the best selling book, "Rocket Boys." Hickam worked in propulsion, spacecraft design and payload design, and crew training at the Marshall Center. From left are Hickam, West Virginia Gov. Cecil Underwood and Tracy Lamm of Marshall's Government and Community Relations Department, who presented a to-scale model of the Space Shuttle to the Coalwood community. The model is on long-term loan.

NASA satellite technology to monitor vehicle pollution

Cities and states may soon have a new high-tech tool in the battle against automotive air pollution, thanks to NASA satellite technology originally developed to track global greenhouse gases and the Earth's protective ozone layer.

As envisioned, NASA's atmospheric remote sensing technology will be adapted to an autonomous roadside system to monitor motor vehicle emissions. Cars and trucks will pass through a low-power light beam, without stopping or slowing down. Space-age sensor technology will instantly analyze vehicle exhaust pollutants important to local and state governments working to meet federally mandated air quality standards.

"Taking an accurate reading of several exhaust products as a car passes by is a formidable challenge. We want to take a measurement of all the gases of interest every one thousandth of a second over a period of a half-second. Fortunately, our newest remote sensing technology has that capability," said Glen Sachse, senior research scientist at Langley Research Center in Hampton, Va. Sachse is one of six team members who invented the highly-sensitive electro-optical system at the core of the technology.

NASA and SPX Service Solutions of Warren, Mich., jointly announced Tuesday that the patented NASA technology has been exclusively licensed to SPX for use in developing a new remote sensing device to monitor motor vehicle exhaust.

"Remote testing of vehicle exhaust will provide governments around the world with a fast, efficient and low-cost method to identify and reduce motor vehicle air pollution and greenhouse gases, which account for approximately one-half of all air pollution," said Craig Rendahl, remote sensing business leader for SPX Service Solutions.

"With the number of vehicles on the road increasing every year, we believe there is a significant global market for technology of this nature," said Rendahl. "SPX will offer a basic unit which will be available at the end of 2000. With the help of NASA, we expect to begin manufacturing a highly enhanced remote sensing device before the end of 2001. This second-generation product will contain many other features, including the capability to test heavy-duty diesel vehicles."

The U.S. Clean Air Act mandates that a certain percentage of the U.S. fleet of vehicles be measured each year. The act

allows for remote sensing as an option.

In a process called "clean screening," drivers who formerly took their vehicles in for an annual emissions inspection would receive a notice in the mail certifying that their vehicle has passed twice in a 12-month period and that they do not have to submit to an emissions test — at least that's the expected outcome for most drivers. As individual roadside exhaust measurements are taken, the vehicle's license plate would be photographed and the data would be transmitted to a central collecting point.

Those drivers whose vehicles passed would save both time and money. Drivers whose vehicles failed or gave marginal readings would be identified for additional testing and possible emissions-related repairs.

In space, NASA uses remote sensing devices mounted on satellites and back lighting from the sun to take global atmospheric measurements as part of its Earth Science Enterprise program. The program is aimed at expanding knowledge of the Earth's environment in order to provide the scientific basis for sound policy decisions on environmental matters.

Batteries

Continued from page 1

auxiliary power unit. The other three options are being developed and tested elsewhere.

Selection of one of the four options for further development and testing is planned for October with possible implementation by 2005. The options being tested are part of the ongoing Shuttle upgrade effort that will include upgrades to the Orbiter and other Marshall Shuttle elements.

"We are trying to make things safer both in flight and on the ground," said Hank Miller, the project lead from the Solid Rocket Booster Office.

"We are looking at replacing the hydrazine powered system — the power supply for the hydraulic pump and actuator that steers the Shuttle — with something potentially safer. The hydrazine fuel presents safety hazards," Miller said. "There is a risk of fire in the aft skirt if there is leakage of any kind, and there is a risk to personnel during processing on the ground."

To replace the hydrazine fuel, Marshall engineers and contractor partners are developing and testing an Electric Auxiliary Power Unit powered by the thermal battery. The unit then powers the existing hydraulic pump to provide hydraulic flow to the actuators used to steer the Space Shuttle. The thermal battery system also has possible application on future launch vehicles.

"For the purposes of ground testing, we have been using two carts of 25 marine batteries — 50 batteries — to provide power to operate the Electric Auxiliary Power Unit," Miller said. "Two thermal batteries will provide the same amount of power."

Thermal batteries are ideal for the Solid Rocket Booster application since they allow most of the energy to be taken from the battery in a matter of minutes. Most other battery types cannot be drained at this rate, resulting in having to carry excess capacity and weight.

Enser Corp. of Tampa, Fla., developed and produced the battery, under a contract with Lockheed Martin Astronautics of Huntsville. "This is not something currently in their product line," Miller said. "It is much larger than anything else they have built."

Other contractors working options are Thiokol of Brigham City, Utah; Moog Inc. of East Aurora, N.Y.; and Hamilton Sundstrand of Rockford, Ill.

The writer, employed by ASRI, is the Marshall Star editor.

Sports

Fitness Technicians — Two part-time fitness technicians have joined the NASA/Marshall Fitness Center staff. Lana Hart has a bachelor's degree in exercise science with a minor in gerontology from Alabama's Jacksonville State University. She has three years' experience in cardiac rehabilitation, fitness programming and group exercise instruction. Hart will work 5-9 a.m., Monday through Friday. Tim Reynolds, who will work from 3:30-7:30 p.m., Monday through Friday, has experience in exercise prescription and training. He has been a fitness technician for the past two years at Huntsville Hospital.

MARS Fishing Results — Results from the July 14 bass tournament on Wheeler Lake at First Creek are: first place — Joe Glover and Ross Evans, 4.90 lbs.; second place — Charlie Nola and Don McQueen, 4.79 lbs.; third Place — John Pea and Karl Gullatte, 2.49 lbs.; big fish — (tie) Charlie Nola and Joe Glover, 1.51 lbs. The next tournament will be Aug. 12 on Guntersville Lake at Goose Pond. For information call Ross Evans at 961-2305, Don McQueen at 544-9073, or Charlie Nola at 544-6367.

MARS Tennis Results — George Noel and Morris Hornbuckle took first place in the July 8 tennis tournament. Tony Kim and Dave Argenti came in second, Larry Newman and Joe Cremin placed third and Bill Boglio and Ron Newby finished fourth.

MARS Golf — A four-person scramble will be at 10 a.m., Aug. 19 at Gunter's Landing. Deadline to register is Aug. 11. A two-person best score tournament will be at 7:30 a.m., Sept. 16 at Point Mallard. Deadline to register is Sept. 8. The Mars Golf Club is open to all NASA employees, onsite contractor personnel and NASA retirees. For more information or to enter a tournament, call Lee Foster at 544-1589, Joey Butler at 544-3808 or Robert Rutherford at 544-8117. Entry fees are \$5.

Answers

Continued from page 2

1. On the Marshall Web at a location called "Safety Search"
2. d) Two million gallons
3. c) Fever. According to the American College of Emergency Physicians, additional common warning signs of a heart attack are sweating, lightheadedness and

feeling faint.

4. c) By far the safest place to be during an electrical storm is in a house or building. The metal plumbing and wiring in the walls of the building form a protective barrier. It is important to remember not to be touching that metallic cage. Stay away from electrical

appliances, plumbing fixtures, etc.

5. a) The majority of bike-related deaths are due to injury to the head. To minimize the risk of head injury, always wear an approved helmet that fits properly.

For more questions, see "Inside Marshall," "The Daily Planet" and ETV.

Employee Ads

Miscellaneous

- ★ Simmons hide-a-bed sofa and loveseat, teal color, \$90 for pair. 461-7833 after 6 p.m.
- ★ Godin guitar, solid body nylon string, \$650. 837-7209
- ★ 1998 Champion bass boat, 18-1/2', 12/24 trolling motor, 3 depth finders, 150HP Mariner motor, low hours, \$14,500. 776-4624
- ★ Ibanez Stagestar electric guitar, Crate GX-15 amp, Quick auto tuner, beginners video/book, \$300. 830-2806
- ★ Brown mink jacket, medium, smooth, not ribbed, size 12, \$2,000. 931-937-6752
- ★ Two car metal garage shed, \$600. 890-0297
- ★ Solid wood crib and 36"x32" baby dresser, \$100. 464-0231 after 6 p.m.
- ★ 1997 12/24 hand control OMC trolling motor, \$250. 233-5032
- ★ Coleman Powermate electric generator, never used, all documentation, \$400 cash. 721-4534 after 5 p.m.
- ★ Epiphone, 4-string acoustic bass, Baggs pickup, \$175. 837-7209
- ★ Fabric sofa and loveseat, \$125; tiller, front tine, 5HP, needs some work; \$25. 881-4148
- ★ Wedding gown hoop slip, worn once, extra full layers, one size fits all, \$30. 351-0196
- ★ 1996 Gulfstream Innsbruck, 21' travel trailer, \$7,900. 881-5093
- ★ Stihl-012 chainsaw, \$115; Stihl-026 chainsaw, \$215; gun cabinet, \$40; Stevens double-barrel shotguns, 12 & 20 gauge, \$125 each. 971-9710
- ★ Jeweltone contemporary floral overstuffed sofa, \$150; eggshell colored sleeper sofa, \$100. 536-6345 or 536-9843
- ★ DP Dual Trac 20 weight machine w/all accessories, \$275. 461-8359
- ★ Queen-size sleeper sofa, neutral upholstery, \$150 obo. 881-1186

Vehicles

- ★ 1989 GMC S-15 Jimmy, 4WD, 4.3L, black/blue, 209K miles, \$3,000 obo. 837-6517
- ★ 1991 Firebird, red, PW/PL, T-top, \$4,800.

- 961-0408/Chris or 961-4574/John
- ★ 1967 VW Beetle, red, great body, runs well, new tires, \$2,500. 379-3939/Arlene
- ★ 1992 Mustang, 120K miles, 4-cylinder, power windows/locks, air bag, \$2,000 obo. 721-9904
- ★ 1999 Toyota Corolla, low miles, \$11,000. 864-2807
- ★ 1989 Honda Civic, 4-door, automatic, \$2,250. 355-1353
- ★ 1989 Blazer S-10, 165K miles, white, 2-door, V-6, air, automatic, moon roof, \$2,450. 883-8947
- ★ 1993 Nissan King-Cab, automatic, a/c, cassette, maroon w/pearl gray camper shell, \$5,200. 880-9025

Free

- ★ Glass panes, one dozen, 13x10-5/8, pale green tint. 837-6776
- ★ Older, overweight, indoor female tabby (calico) cat looking for loving home, spayed and shots. 882-2186

Found

- ★ Ankle bracelet, parking lot, Bldg. 4200. Call 544-4758 to identify

Wanted

- ★ Palm Pilot, good condition. 325-6000

Center Announcements

- ✦ **MARS Luau Dinner Dance** — Tickets for the Aug. 12 Luau dance are available. The Hawaiian/casual event will be at 6:30 p.m. at the Von Braun Center East Exhibit Hall and will feature ballroom music by The Night Owls band. Socializing will begin at 6:30 p.m., and a buffet dinner will be served at 7 p.m., followed by dancing from 8-11 p.m. Tickets are \$19 per person with a \$3 discount for members. They can be purchased from Linda Kinney at 544-0563, Tamara Landers at 544-6818, Pat Sage at 544-5427, Ed Ogozalek at 837-1486, Bob Williams at 544-3998, Hugo Berry at 544-3525, Woody Bombara at 650-0200, and Earl Herndon at 534-7408. Reservations for

a table of eight can be made by calling Bombara at 650-0200.

- ✦ **Computer Classes** — Florida Tech is offering a computer network certificate program beginning with the Fall semester. For more information, call 881-7878.
- ✦ **Shuttle Buddies** — The Shuttle Buddies will meet for breakfast at 9 a.m. July 24 at Mullins Restaurant on Andrew Jackson Way. For more information, call 881-7757 or 852-8189.
- ✦ **MESA Meets** — The Marshall Engineers and Scientists Association will meet at 11:30 a.m. July 20 in Bldg. 4471, room C-105.
- ✦ **MOO Meets** — The Management Operations Office (MOO) retirees will meet for breakfast/lunch at 10 a.m. on July 27 (4th Thursday) at the Cracker Barrel Restaurant in Madison. For more information, call 539-0042.
- ✦ **NARFE Meets** — The National Association of Retired Federal Employees (NARFE)-Decatur/Morgan County Chapter 736 will meet at 11 a.m., July 27 at Piccadilly's in Decatur. All retired federal employees are welcome. For more information, call Marty Eddy at 773-4826.

Job Opportunities

SES Announcement MSFC-ES-08-00. Chief Operating Officer, national Space Science and Technology Center, Science Directorate. Closes Aug. 14.

SES Announcement MSFC-ES-11-00. Deputy Director, Science Directorate. Closes Sept. 15.

SES Announcement MSFC-ES-10-00. Manager, Subsystems and Components Development Department, Space Transportation Directorate. Closes Oct. 13.

CPP-00-92-EB, AST, Technical Resources Management, GS-801-13, Engineering Directorate, Avionics Department. Closes July 27.

CPP 00-104-RE, Supv, AST, Liquid Propulsion Systems, GS-861-14, Space Transportation Directorate, Engine Systems Engineering Group. Closes July 27.

MARSHALL STAR

Vol. 40/No. 45

Marshall Space Flight Center, Alabama 35812
(256) 544-0030
<http://www1.msfc.nasa.gov>

The Marshall Star is published every Thursday by the Internal Relations and Communications Department at the George C. Marshall Space Flight Center, National Aeronautics and Space Administration. Contributions should be submitted no later than Monday noon to the Marshall Internal Relations and Communications Department (CD40), Bldg. 4200, room 101. Submissions should be written legibly and include the originator's name. Send electronic mail submissions to: intercom@msfc.nasa.gov The Marshall Star does not publish commercial advertising of any kind.

Acting Manager of Internal Relations
and Communications — Tereasa Washington
Editor — Debra Valine

U.S. Government Printing Office 2000-533-127-20007

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Permit No. G-27